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JC867 U.S. PTO 11/14/00

JC813 U.S. PTO 09/711381 11/14/00

UTILITY PATENT APPLICATION TRANSMITTAL

(Only for new nonprovisional applications under 37 CFR 1.53(b))

Attorney Docket No.	
First Inventor	
Title	
Express Mail Label No.	

APPLICATION ELEMENTS

See MPEP chapter 600 concerning utility patent application contents.

ADDRESS TO: Assistant Commissioner for Patents
Box Patent Application
Washington, DC 20231

1. [X] Fee Transmittal Form (e.g., PTO/SB/17) *(Submit an original and a duplicate for fee processing)*
2. [X] Applicant claims small entity status. See 37 CFR 1.27.
3. [X] Specification [*Total Pages* 7]
   (preferred arrangement set forth below)
   - Descriptive title of the invention
   - Cross Reference to Related Applications
   - Statement Regarding Fed sponsored R & D
   - Reference to sequence listing, a table, or a computer program listing appendix
   - Background of the Invention
   - Brief Summary of the Invention
   - Brief Description of the Drawings *(if filed)*
   - Detailed Description
   - Claim(s)
   - Abstract of the Disclosure
4. [X] Drawing(s) *(35 U.S.C. 113)* [*Total Sheets* 1]
5. Oath or Declaration [*Total Pages*]
   a. [X] Newly executed (original or copy)
   b. [ ] Copy from a prior application (37 CFR 1.63 (d)) *(for continuation/divisional with Box 18 completed)*
      i. [ ] DELETION OF INVENTOR(S)
      Signed statement attached deleting inventor(s) named in the prior application, see 37 CFR 1.63(d)(2) and 1.33(b).
6. [ ] Application Data Sheet. See 37 CFR 1.76
7. [X] CD-ROM or CD-R in duplicate, large table or Computer Program *(Appendix)*
8. Nucleotide and/or Amino Acid Sequence Submission *(if applicable, all necessary)*
   a. [ ] Computer Readable Form (CRF)
   b. Specification Sequence Listing on:
      i. [ ] CD-ROM or CD-R (2 copies); or
      ii. [ ] paper
   c. [ ] Statements verifying identity of above copies

ACCOMPANYING APPLICATION PARTS

9. [ ] Assignment Papers (cover sheet & document(s))
10. [ ] 37 CFR 3.73(b) Statement *(when there is an assignee)* [ ] Power of Attorney
11. [ ] English Translation Document *(if applicable)*
12. [ ] Information Disclosure Statement (IDS)/PTO-1449 [ ] Copies of IDS Citations
13. [ ] Preliminary Amendment
14. [ ] Return Receipt Postcard (MPEP 503) *(Should be specifically itemized)*
15. [ ] Certified Copy of Priority Document(s) *(if foreign priority is claimed)*
16. [ ] Request and Certification under 35 U.S.C. 122 (b)(2)(B)(i). Applicant must attach form PTO/SB/35 or its equivalent.
17. [ ] Other: .....

18. If a CONTINUING APPLICATION, *check appropriate box, and supply the requisite information below and in a preliminary amendment, or in an Application Data Sheet under 37 CFR 1.76:*

[ ] Continuation [ ] Divisional [ ] Continuation-in-part (CIP) of prior application No.: ____/____

Prior application information: Examiner _____ Group Art Unit: _____

For CONTINUATION OR DIVISIONAL APPS only: The entire disclosure of the prior application, from which an oath or declaration is supplied under Box 5b, is considered a part of the disclosure of the accompanying continuation or divisional application and is hereby incorporated by reference. The incorporation can only be relied upon when a portion has been inadvertently omitted from the submitted application parts.

19. CORRESPONDENCE ADDRESS

[ ] *Customer Number or Bar Code Label* (Insert Customer No. or Attach bar code label here) or [ ] *Correspondence address below*

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Name (Print/Type)	David S. Bettinger	Registration No. (Attorney/Agent)	
Signature	David S. Bettinger	Date	11 Nov 2000

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"Fee for "Conformable Reflective Display Element"

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FEE TRANSMITTAL for FY 2001

Patent fees are subject to annual revision.

TOTAL AMOUNT OF PAYMENT ($) 355.-

Complete if Known	
Application Number	
Filing Date	
First Named Inventor	
Examiner Name	
Group Art Unit	
Attorney Docket No.	

METHOD OF PAYMENT

1. ☐ The Commissioner is hereby authorized to charge indicated fees and credit any overpayments to:
   - Deposit Account Number
   - Deposit Account Name
   - ☐ Charge Any Additional Fee Required Under 37 CFR 1.16 and 1.17
   - ☐ Applicant claims small entity status. See 37 CFR 1.27
2. ☐ **Payment Enclosed:** ☑ Check ☐ Credit card ☐ Money Order ☐ Other

FEE CALCULATION

1. BASIC FILING FEE

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description	Fee Paid
101	710	201	355	Utility filing fee	355.-
106	320	206	160	Design filing fee	
107	490	207	245	Plant filing fee	
108	710	208	355	Reissue filing fee	
114	150	214	75	Provisional filing fee	

SUBTOTAL (1) ($) 355.-

2. EXTRA CLAIM FEES

	Extra Claims		Fee from below	Fee Paid
Total Claims	4	-20** = 0	X	=
Independent Claims	1	- 3** = 0	X	=
Multiple Dependent				=

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description
103	18	203	9	Claims in excess of 20
102	80	202	40	Independent claims in excess of 3
104	270	204	135	Multiple dependent claim, if not paid
109	80	209	40	** Reissue independent claims over original patent
110	18	210	9	** Reissue claims in excess of 20 and over original patent

SUBTOTAL (2) ($)

**or number previously paid, if greater; For Reissues, see above

FEE CALCULATION (continued)

3. ADDITIONAL FEES

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description	Fee Paid
105	130	205	65	Surcharge - late filing fee or oath	
127	50	227	25	Surcharge - late provisional filing fee or cover sheet	
139	130	139	130	Non-English specification	
147	2,520	147	2,520	For filing a request for *ex parte* reexamination	
112	920*	112	920*	Requesting publication of SIR prior to Examiner action	
113	1,840*	113	1,840*	Requesting publication of SIR after Examiner action	
115	110	215	55	Extension for reply within first month	
116	390	216	195	Extension for reply within second month	
117	890	217	445	Extension for reply within third month	
118	1,390	218	695	Extension for reply within fourth month	
128	1,890	228	945	Extension for reply within fifth month	
119	310	219	155	Notice of Appeal	
120	310	220	155	Filing a brief in support of an appeal	
121	270	221	135	Request for oral hearing	
138	1,510	138	1,510	Petition to institute a public use proceeding	
140	110	240	55	Petition to revive - unavoidable	
141	1,240	241	620	Petition to revive - unintentional	
142	1,240	242	620	Utility issue fee (or reissue)	
143	440	243	220	Design issue fee	
144	600	244	300	Plant issue fee	
122	130	122	130	Petitions to the Commissioner	
123	130	123	130	Petitions related to provisional applications	
126	180	126	180	Submission of Information Disclosure Stmt	
581	40	581	40	Recording each patent assignment per property (times number of properties)	
146	710	246	355	Filing a submission after final rejection (37 CFR § 1.129(a))	
149	710	249	355	For each additional invention to be examined (37 CFR § 1.129(b))	
179	710	279	355	Request for Continued Examination (RCE)	
169	900	169	900	Request for expedited examination of a design application	

Other fee (specify) _____

*Reduced by Basic Filing Fee Paid **SUBTOTAL (3)** ($)

SUBMITTED BY				Complete *(if applicable)*	
Name (Print/Type)	David S. Bettinger	Registration No. (Attorney/Agent)		Telephone	734-675-8295
Signature	David S. Bettinger			Date	11 Nov 2000

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CONFORMABLE REFLECTIVE DISPLAY ELEMENT

FIELD OF THE INVENTION

The present invention relates to a reflective optical element based upon a reflective film, tape, or sheet applied to an optically shaped surface. In particular, the present invention relates to a spectacle and goggle mounted display and viewer that uses an inside concave portion of a lens surface for a reflective optical element and mirror.

BACKGROUND OF THE INVENTION

Many spectacle and goggle mounted devices require at least one reflective element or mirror. Examples of such applications are glasses mounted displays and glasses mounted mirrored viewers for cyclists.

To apply a silvered or aluminized reflective surface to a small portion of an eyeglass lens for a display or viewer requires the attention of a specialized laboratory. About half of the population wears prescription glasses and would be adverse to giving them up for disassembly and further lab work to obtain a display. Sunglasses used by those with normal vision are selected for style and purchased for use without delay for laboratory work. Thus the delay and inconvenience of sending eyeglasses to a mirroring laboratory is a hindrance to making glasses mounted display devices readily available and widely acceptable.

For spectacle mounted displays with large numerals such as a digital clock, the precision and cost of masking and sputtering a protected aluminized coating onto a glasses lens surface has proven to be a costly and overly precise optical response. While an aluminized coating may provide an excellent optical image of the object, in this case four numerals, such precision of image is unnecessary for the user to be able to discern the time correctly.

SUMMARY OF THE INVENTION

In order to overcome the shortcomings of the current condition, the present invention is directed to a reflective optical element comprising a lens possessing at least one optically shaped surface a portion of which is suitable as an adhesive substrate on which is disposed a lens film comprising an adhesive layer and backing selected to maintain a uniform thickness when deformed, a metal foil and metallized polymer layer possessing a uniform light reflecting surface and of a thickness selected to be flexible when deformed, wherein said lens film is applied and secured to said lens with pressure and stress to conform to said optically shaped surface and adhere said adhesive backing to said lens substrate. Said light reflecting surface is selected and positioned within the optical train of a spectacle mounted display and viewer. In some embodiments of the present invention, the lens film is partly transparent. In the preferred embodiment of the current invention as a spectacle mounted display, the resulting image quality is suitable for the display of a limited quantity of text.

In the prior art, reflective tape was considered to be too imprecise a medium for functioning as an optical element to generate a recognizable image. Although metallized film is readily available as flat mirrors for decorative purposes, spherical, cylindrical or aspheric shapes in small sizes lens were considered unlikely to produce acceptable images for any possible application.

It is the object of this invention to provide an immediate and easy application of a reflective layer to an optical surface of a glasses or goggles mounted display.

It is also an object of this invention to provide a reflective surface of a quality that is consistent with the legibility and accuracy of simple, limited text and graphic images by a glasses or goggles mounted display such as used in a pager, cellular phone, or personal digital assistant. Personal glasses mounted displays must minimize the area they occult to maintain forward viewing. For purposes of this invention the definition of simple, limited text is taken to be fewer than 25 vertical lines of text. Such text when displayed at letter heights of .3 degree or greater minimizes the effects of reflective surface imperfections.

It is a further object of this invention to provide a reflective coating that can be applied under field rather than laboratory conditions.

It will be understood by one skilled in the art that protective means may be applied to the reflective metal layer to protect against scratches. Such a protective means may consist of two protecting transparent layers wherein at least one protecting layer is disposed on each face of said reflective metal layer.

It will also be understood by one skilled in the art that by the use of a transparent adhesive that the current invention can be applied to the front surface of a spectacle lens. In this case a light ray from the object will pass through the spectacle lens and the adhesive layer to be reflected back through the adhesive and the spectacle lens.

It will further be understood by one skilled in the art that a metallized film may be selected to be partly transparent to provide a forward view through the glasses as well as a reflective view of the image. In such an application a transparent adhesive such as 3M Optically Clear Laminating Adhesives 8141 and 8142 would be selected so as not to hinder forward viewing.

BRIEF DESCRIPTION OF THE DRAWINGS

Referring now to the drawings:

Figure 1 is a partial perspective view of the left spectacle side in accordance with the principles of the present invention wherein the reflective film element conforms precisely to the shape and curve of the inside surface of a portion of the spectacle lens which is rendered reflective;

Figure 2 is an enlarged cross-sectional view of a small portion of reflective, adhesive metal lens film mounted on an optical flat.

Figure 3 is an enlarged cross-sectional view of a small portion of the preferred embodiment in accordance with the principles of the present invention, in which the inside surface of a spectacle lens serves as a substrate for the adhesive backing of the reflective conformal lens film;

DETAILED DESCRIPTION OF THE INVENTION

Referring to the Drawings, in general, Figure 1 illustrates the left half of a spectacle frame 1 within which is mounted the left lens 2 of an eye correction or eye

protection device. The spectacle lens 2 has a center of view 5 determined by horizontal axis 3 and vertical axis 4. In a preferred embodiment of the invention, lens 2 is a spherical or aspheric lens possessing a concave surface upon which is mounted a reflective lens film 6, for a glasses mounted display. Optical and electronic elements of a glasses mounted display are not considered a part of the present invention and are not shown for clarity of the present invention.

Lens film 6 is mounted on lens 2 using the adhesive layer of the film. Lens film 6 may be configured to be either permanently or, detachably mountable on lens 2 if the reflective surface is damaged and requires replacement.

Figure 2 shows a lens film made up of a metallized coating surface 12 on a polymer layer 13 and an adhesive layer 11 attached and mounted on a optical flat 21 on a flat surface 18 suitable for adhesive attachment. Because of the flat surface the light ray 14 is reflected as light ray or bundle 15 at equal angles of incidence and reflection to the metal film surface 12. The reflective metal material is from one of the bright reflective metals or alloys such as aluminum, copper, gold, silver, titanium, Inconel, or stainless steel. Although metal foil is used, it is usual and preferable for one of the metals to be vapor-coated or sputtered onto a polymer substrate to form the reflective layer 12. Suitable polymer substrates for sputtering may be made from acrylic polymers, such as acrylate, methacrylate, polyethylene, polypropylene, polyvinylchloride, nylon, and polyesters, such as polyethylene terephthalate, as well as other co-polymers known to those skilled in the art. Such polymeric films 13 are well-known in the art and are commercially available in thickness ranging from less than 0.5 mils to more than 10 mils (1 mil equals 0.001 inch).

Mounting adhesive 11 may be a contact adhesive, such as adhesive tape or pressure sensitive adhesive, or may require water or another solvent to activate or expose the adhesive. Preferably the lens film is furnished with a protective removable layer over the mounting adhesive 11 to prevent unwanted adhesion of the lens film to other objects prior to application to the lens 21.

Figure 2 also illustrates the effect of a partly transparent reflective metallized surface 12. In this case a portion of the light bundle 14 is reflected as ray 15 and in

addition a portion of the light bundle 20 continues through the transparent polymer 13, the transparent adhesive 11, and the lens 21.

Figure 3 shows the reflective metallized surface coating 12 on the polymer film 13 mounted with adhesive layer 11 to a spherical surface 19 of the lens 16. In this case the adhesive 11 conforms to and maintains the spherical surface 19 of lens 16 due to the prior selection of the proper thickness qualities. In this preferred embodiment the reflective surface coating 12 also conforms to the curvature of the spherical surface 19 of lens 16 due to the selection of the proper flexibility qualities. Light from the object is shown as a light ray 14 being reflected as light ray 17 at a steep angle due to the curvature of the reflective surface coating 12 that has been assumed from the underlying lens 16.

EXAMPLES

Example number one is a glasses mounted display that uses a .7 inch diagonal 640x480, flat panel display as manufactured by Planar, Inc. mounted on the temple of the glasses set to display 25 lines of text maximum. The concave inside surface of the glasses lens has a radius of curvature of 500 mm. The lens film that is applied to the lens is a 2.5 mil thick bright metallized acrylic backed by .6 mil thick 3M No. 320 adhesive. The thickness of the flexible acrylic is selected to conform to the spherical lens shape maintaining an approximate optical surface without bubbles or ripples. The resultant image, equivalent to a 9 inch diagonal measure desktop monitor, is legible with slight distortions.

Example number two is a glasses mounted display that uses an LED watch module with 3.0 mm high digits as manufactured for Radio Shack as #63-5093 mounted on the temple of the glasses. The concave inside surface of the glasses lens has a radius of curvature of 500 mm. The lens film that is applied to the lens is a 2.0 mil thick bright metallized polyester backed by .8 thick 3M No. 300 adhesive. The thickness of the flexible acrylic is selected to conform to the spherical lens shape maintaining an appropriate, usable and practicable optical surface without bubbles but with some observed surface irregularities. The resultant numeric image which subtends a vertical angle of 3 degrees is legible without distortions.

CLAIMS

What is claimed and worthy of a letter patent is

1. A reflective optical element comprising:

a lens possessing at least one optically shaped surface, a portion of which is suitable as an adhesive substrate,

on which is disposed a lens film comprising

(1) an adhesive layer and backing selected to maintain a uniform thickness when deformed,

(2) a metal foil and metallized polymer layer possessing a uniform light reflecting surface and of a thickness selected to be flexible when deformed,

wherein said lens film is applied and secured to said lens with pressure and stress to conform to said optically shaped surface and adhere said adhesive backing to said lens substrate.

2. The reflective optical element of claim 1 wherein said light reflecting surface is selected and positioned within the optical train of a spectacle mounted display and viewer.

3. The reflective optical element of claim 1 whereby said lens film is partly transparent.

4. The reflective optical element of claim 2 whereby the image quality of said spectacle mounted display is suitable for the display of a limited quantity of text.

Abstract

A metallized polymer adhesive film is applied and conforms to the shape of a spherical or aspheric optical surface of a lens to create a reflecting element in an imaging display. In the preferred embodiment the lens, film is mounted on the inside concave surface of a spectacle lens where it assumes the shape of the parent lens to act as a reflective optical element for a glasses mounted display.

Fig. 1.

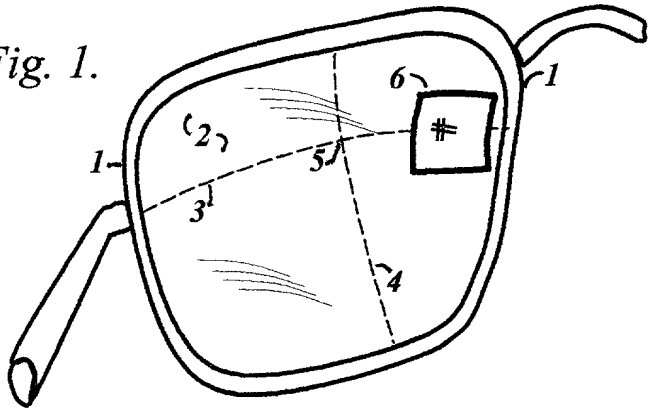


Fig. 2.

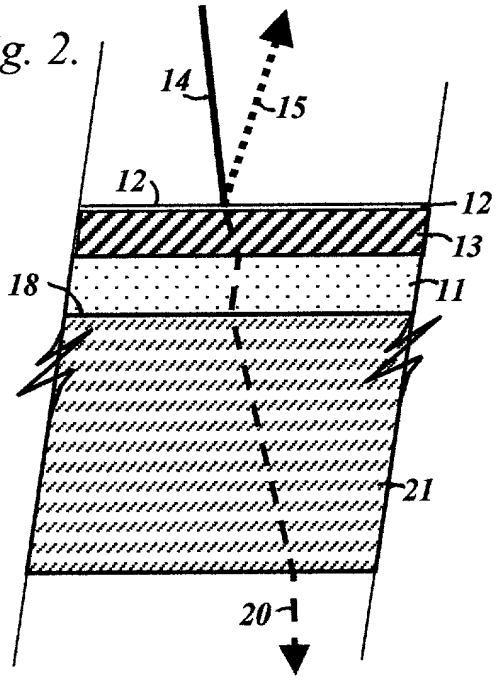
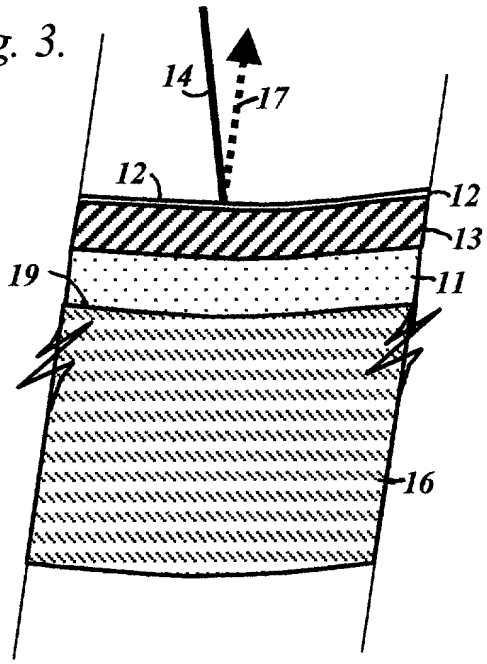


Fig. 3.



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DECLARATION FOR UTILITY OR DESIGN PATENT APPLICATION (37 CFR 1.63)

[X] Declaration Submitted with Initial Filing OR [ ] Declaration Submitted after Initial Filing (surcharge (37 CFR 1.16 (e)) required)

Attorney Docket Number	
First Named Inventor	
COMPLETE IF KNOWN	
Application Number	/
Filing Date	
Group Art Unit	
Examiner Name	

As a below named inventor, I hereby declare that:

My residence, mailing address, and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

CONFORMABLE REFLECTIVE DISPLAY ELEMENT

(Title of the Invention)

the specification of which

[X] is attached hereto

OR

[ ] was filed on (MM/DD/YYYY) [ ] as United States Application Number or PCT International Application Number [ ] and was amended on (MM/DD/YYYY) [ ] (if applicable).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment specifically referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56, including for continuation-in-part applications, material information which became available between the filing date of the prior application and the national or PCT international filing date of the continuation-in-part application.

I hereby claim foreign priority benefits under 35 U.S.C. 119(a)-(d) or 365(b) of any foreign application(s) for patent or inventor's certificate, or 365(a) of any PCT international application which designated at least one country other than the United States of America, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate, or any PCT international application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application Number(s)	Country	Foreign Filing Date (MM/DD/YYYY)	Priority Not Claimed	Certified Copy Attached? YES	NO
			[ ]	[ ]	[ ]
			[ ]	[ ]	[ ]
			[ ]	[ ]	[ ]
			[ ]	[ ]	[ ]

[ ] Additional foreign application numbers are listed on a supplemental priority data sheet PTO/SB/02B attached hereto:

I hereby claim the benefit under 35 U.S.C. 119(e) of any United States provisional application(s) listed below.

Application Number(s)	Filing Date (MM/DD/YYYY)	
		[ ] Additional provisional application numbers are listed on a supplemental priority data sheet PTO/SB/02B attached hereto.

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DECLARATION — Utility or Design Patent Application

Direct all correspondence to: ☐ Customer Number or Bar Code Label [ ] OR ☐ Correspondence address below

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USA	734n 675-8295	734 675-8296

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. 1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

NAME OF SOLE OR FIRST INVENTOR : ☐ A petition has been filed for this unsigned inventor

Given Name (first and middle [if any])	**Family Name or Surname**
David S.	Bettinger

Inventor's Signature David S. Bettinger **Date** 11 Nov 2000

Residence: City	**State**	**Country**	**Citizenship**
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Mailing Address 8030 Coventry

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NAME OF SECOND INVENTOR: ☐ A petition has been filed for this unsigned inventor

Given Name (first and middle [if any])	**Family Name or Surname**

Inventor's Signature **Date**

Residence: City	**State**	**Country**	**Citizenship**

Mailing Address

Mailing Address

City	**State**	**ZIP**	**Country**

☐ Additional inventors are being named on the ____supplemental Additional Inventor(s) sheet(s) PTO/SB/02A attached hereto.